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TEAMING UP FOR MUTUAL LEARNING - A CASE STUDY OF MERGING INNOVATION APPROACHES OF A MEDIUM-SIZED COMPANY

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ABSTRACT
The focus of this paper is two-folded within the theme of collaboration between education and industry. Firstly it unfolds how learning for design-engineer students can be established and facilitated in a dynamic setting with industrial partners and secondly how industrial partners can benefit from student collaboration. The paper is based on research activities carried out in the context of a 3rd semester project at the Industrial Design MSc program at The School of Architecture, Design & Planning at Aalborg University. Here, the teaching style is Problem Based Learning (PBL). In PBL, student's focuses on a complex problem that does not have a single correct answer – in this case the addressed problem was concerned with the innovation approach of a medium-sized company. Traditionally innovation projects and strategic planning has emerged from top managers offices and has been based on i.a. technological an economic factors. An alternative approach has emerged, which suggests that innovation is most successfully initiated by the research and design resources with-in a company. The two approaches are denoted as respectively Top-down and Bottom-up [5]. Practicing the Top-down approach was familiar and integrated within the company, while the student introduced the Bottom-up approach during the project - the initiatives, experiences and observations are reported in this paper.

Keywords: Collaboration, industry, problem-based learning, bottom-up strategies

1 INTRODUCTION

Collaborative constellations between education and industry can become synergetic and offer mutual learning for the involved parties through following the principles of Problem Based Learning. This paper describes how such collaborative constellation developed into a fruitful collaboration resulting in valuable insights and knowledge for both the company and the student. A student research project on the topic of bridging the traditional Top-down strategies with Bottom-up activities resulted in a set of guidelines for how integration of the Top-down and Bottom-up approaches can be enabled. This turned out to be an inspirational and multidimensional experience for the company and for the student. Collaborative constellations can offer a platform where curious students with state of art knowledge and good skills can meet the 'real life' challenges within industry. Such a platform also offers a great opportunity for companies to engage with the academic world through collaboration with students. This is especially relevant for small and medium-sized production companies as they often have a low number of employees with an academic background. The collaboration provides an opportunity to become inspired from both the methods applied and an alternative approach to the challenges that the company is confronted with in the daily life. In this sense a setting for mutual learning is created.

2 ENGAGEMENT IS CENTRAL

It is commonly agreed that the core of Problem Based Learning (PBL) is the motivating factor for learning with the purpose of understanding and solving a given problem. Hmelo-Silver crystalizes this by stating: "Problem-based learning (PBL) is an instructional method in which students learn through facilitated problem solving. In PBL, student learning centres on a complex problem that does not have a single correct answer. Students work in collaborative groups to identify what they need to learn in order to solve a problem. They engage in self-directed learning (SDL) and then apply their new knowledge to the problem and reflect on what they learned and the effectiveness of the strategies

employed" [3]. The principles of PBL is applied at the School of Architecture, Design, and Planning's different educations and it is highly relevant for the Industrial Design education. At the Industrial Design education the third semester on the MSc is called "Design Research and Strategy". The objective of the semester is to strengthen the student's professional self-conception and his/her ability to work with aspects of design in relation to current research themes.
This is an opportunity to dive into a specific field of interest within the field of industrial design, which can help the students in obtaining specific skills, knowledge and competences and eventually a certain profile. This paper will introduce a student case from the "Design Research and Strategy" semester, which revolves around a Danish production company that produces staircases, attic ladders and handrail systems. The products are sold in numerous countries, mainly in Europe and the products are introduced to the market by distributors, which are selling the products to the end-users through retailers. The student' project revolves around the product group of attic ladders.
In collaboration with the R&D department an assignment was formulated on the basis of a challenge identified by the company. The company had, due to its position in the value chain, limited knowledge of their end-customers consumption behaviours. At this time they where facing the challenge of introducing a new product concept to the market and they were aware of how improved knowledge and understanding of the end-users in the Do-it-Yourself (DIY) markets might help improve this process. However the company was not experienced in engaging with their end-customers or handling this type of knowledge in the company.
In the product category of attic ladders – as in many others –the products had become more and more similar in technological and functional capacities. Therefore something needed to be added to differentiate a product [6]. This attribute could be services or experiences associated to the product – the challenging problem was defined collaboratively concerned this matter and was formulated as: *How can the experienced value of the new attic ladder product line be increased by the implementation of User Centred Design activities in the development process of supplementing services?*

2.1 A new ballgame at the DIY markets

Creating a new situation or changing the existing one by adding immaterial value is challenging for the mind-set of both businesses and designers. The potential value of services and experiences is not produced until a customer chooses to interact with them. And even when this happens, the value produced is very affected by the mind-set of the user and by the context that the interaction takes place in. This new situation challenges the traditional approach to businesses' strategic planning, that is often driven by management decisions based on market analysis, technological and economic developments [5]. Through this approach defined as Top down Innovation the decision makers will gain none or very little understanding of the end-users subjective worlds. They will therefore lack knowledge that will help them predict how their value propositions will be received. Therefore another approach to business and product innovation has emerged - the "Bottom-up approach" [5]. This approach does not evolve from the management offices, but from the research and design resources of the company and focuses on cultural and contextual understanding of the end-users and their worlds. The Bottom-up approach further more focuses on qualitative and tacit knowledge, whereas the Top-down approach is typically founded in explicit, quantitative knowledge [5] The company had already developed a Strategy Canvas [4] as a Top-Down activity defining the strategy of a new product range. The canvas introduces a number of product capabilities in a prioritized order. To the company the aim of the development project is to ensure that the end-users' perception of the new products is in line with the Strategy Canvas' definition. They wished to ensure that their new product priorities was communicated clearly so that the customers recognize the change and become aware of the new product strengths.

3 BRIDGING TOP-DOWN WITH BOTTOM-UP

The student research activities were applied to let the Top-down approach be inspired by the Bottom-up activities. To meet this challenge the student conducted field studies as a Bottom-Up activity several times throughout the project. Firstly a round of situated interviews with six Danish DIY men in their private homes were conducted. Here the attic ladder was central in the discussion and a value-prioritizing activity was also carried out. At a later stage the service concepts was evaluated with the DIY-men through Customer Journey illustration [2]. The further challenge when having conducted

those activities was to integrate them into the company' processes. In the following three initiatives of the student' research activities will be presented. The three activities are 'Workshop of implementing user research', secondly 'Transitioning design parameters into ideas' and conclusively a 'Concept evaluation workshop'. Common for the first and the last is the involvement of representatives from the company, while the student carried out the second activity single-handedly.

3.1 Workshop of implementing user research

This workshop constituted the first meeting between the representatives of the company's internal development team and the student. Prior to this meeting the field studies mentioned above had been conducted. These visits established an understanding of the users' experiences around researching, choosing, buying and mounting their ladders. The users furthermore composed schemes with a specific prioritizing of the values that they found important in relation to those phases of activities. The visits were documented in video.

The workshop took its offset in thematic Video Portraits of the users [7]. The portraits were 8-10 minutes long compositions of video material representing each users experiences regarding his ladder and his prioritizing of values. The value prioritization was composed in a scheme and directly compared to the company's Strategy Canvas (where those two were compatible). While watching these portraits all representatives at the meeting noted interesting or surprising statements or actions of the users on little key word-cards that related to each user by a picture, Figure 1, which was inspired by the Video Card Game originally introduced by Buur & Søndergaard [1]. Afterwards a shared understanding of the problem at hand was developed through categorizing the observations in themes. Finally the themes were divided into three main groups relating to the nature of the themes. The groups in this case represented 'Design challenges', 'Design opportunities' and 'Possible delivery channels'.

Figure 1. The Video Card Game activity

3.2 Transitioning design parameters into ideas

This activity served as an important tool for combining the parameters emerging from both the Top-down and the Bottom-up approach into solution concepts. The various user-centered and strategic parameters were physically represented in a large brainstorm-board as a platform for idea development. The four parameters were in this case the categories of the Strategy Canvas and the three groups of themes defined through the first workshop. A conceptual sketch of the Idea Landscape can be seen in Figure 2. The Idea Landscape acted as tool for weaving together Top-down as well as Bottom-up parameters in concrete ideas.

Ideas for services and experiences were generated within this landscape by starting from one parameter and generating an idea based on that. The idea was to develop visual connections between the synergetic parameters.

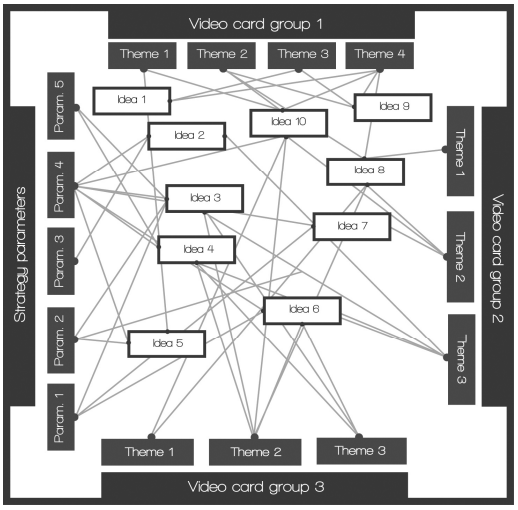

Figure 2. Principle of the Idea Landscape

3.3 Concept evaluation – Workshop

This activity took place at a late stage of the project where solution concepts had been developed. The student was facilitator for the company representatives. The aim of the workshop was to discuss and evaluate the concepts and to agree upon a future direction. The concepts should at this stage be evaluated not only with regards to company and the end-users, but also to the distributors and retailers that are to take part of the delivery of the value propositions to the end-users.

Prior to this activity a second round of user research had been conducted, where the developed ideas from the Idea Landscape were evaluated with end-users. The evaluation investigated their approach towards the various encounters and clarified which they would and would not use in an imagined process of choosing, buying and mounting a ladder. This was done through a session based on the method of Customer Journeys [2].

The workshop started with a presentation with two main themes: 1) It emphasized to how the suggestions were based upon an integration of the Strategy Canvas parameters and the output of our former common activity of Video Card Game, 2) It included references to the users evaluation of the concepts. When presenting the service ideas they were represented physically as cardboard cards with an illustration and a short text describing the idea. These were to be used in a board game, which was the main activity of the workshop.

The game supported the process of evaluating the service concepts with regard to all partners of the Value Chain. The game board graphically represented the Value Chain and its various links. These were in this case producer, distributor, retailer and end-user. The Value Chain was represented as a circle of two layers surrounding one of the encounter cards. The players were to choose a card representing a service idea of special interest and place them physically on the Value Chain. In the game activity the players started by defining the effort of company, then the distributor, retailer and end-user. Efforts were written on post-its and placed on the game board. As this was done the journey went backwards within the outer circle towards company and the players defined the gain that each partner would experience as a result of their effort.

4 STUDENT LEARNING

The student formulated a set of guidelines on how a facilitator can plan activities that will enable integration of the Top-down and Bottom-up innovation approaches. The guidelines are based upon the experiences achieved through the described activities.

1) Think holistically when planning research activities - when planning research activities put effort into integrating relations to both approaches. If planning Bottom-up research include references to parameters that are important in the mind-set of the representatives of the Top-down approach. In the specific case the Top-down planned Strategy Canvas defined the form of how to discuss values with end-users. This enabled a direct comparison of value prioritizations that connected the two approaches.

2) Share not only outcomes but also processes - when presenting suggestions or research of one approach do not limit the presentation to communicate outcomes. Include also information on the process that led to it and be sure to highlight how it integrated parameters of both approaches.
   This will enable a better understanding in between the two approaches and it will help validate the outcomes or suggestions that are to be presented.
   In the case context the Concept Evaluation Workshop included a process presentation. This clarified that the suggestions build on parameters of both approaches and ensured a positive reception of the concepts generated.
3) Be physical whenever possible - seek to represent the topic of discussion physically when facilitating a session where common decisions are to be taken seek to represent the topic of discussion physically. Having physical representations enable the involved parties to physically handle the topics in play. Different proposals can be grouped, prioritized or even physically thrown in the bin. Every participant can handle the topics and the current stage of the discussion is clear to everyone.
4) Create material that can travel - when interchanging information in between the representatives of the two approaches, strive to create physical and visual material. Information captured in these ways continues to represent itself and it not just forgotten in an email inbox. Such material is also more likely to travel in the organization and spread a wider understanding.
   In the case the Video Portraits produced and used in the workshop of Implementing User Research was an example of such. The portraits were visual representations of a large amount of research material. The company is planning to have a workshop with participation from across the organization were the Video Portraits can help spread a common understanding of the end-user.
5) Prefer common analysis to presentation of results - when interchanging results or material in between the two approaches strive to present empathy evoking material above hard data. If for example an interview has been carried out, present the essentials through the words of the interviewed as opposed to analyzed and well-formulated conclusions made by the representatives of one approach. Analyze the material together and define a common understanding and conclusion.
   In the case context the Video Portraits acted as an empathy evoking representation of research material and proved successful as a starting point as the team agreed upon the essential outcomes of the research.
6) Include perspectives of both approaches in every activity - when planning common activities of analysis or decision-making make sure to include perspectives that are related to the interests of both approaches.
   The Idea Landscape represented parameters emerging from both approaches and the outcome was a number of solution concepts emerging from the integration of those.
7) Stage common challenges that can only be solved together - when planning activities strive to stage a challenge that can only be solved through common effort. The activity should encourage the sharing and processing of knowledge in order to reach a common goal.
   In the specific case the board game of the Concept Evaluation Workshop represents an example of this. To be able to complete the game knowledge from both approaches about desired gains and attitudes towards effort was needed.

5 COMPANY LEARNING

To the production company the process resulted in valuable experiences and new knowledge. Firstly, it has been a new experience to the company representatives to be activated in the process of defining shared outcomes during the common workshops as opposed to being presented to outputs or results generated by "another part" – often consultancies. Especially the effectiveness of using video material as the base material of such a generation of shared outcome impressed the representatives. They felt that they got to know their users through this media in a very different way than they would expect from being told about them and their values. An experience that has also made the company representatives engage in planning a workshop with more company representatives and distributors where the Video Portraits would serve as a tool for gaining a common understanding of their end customers.

The company representatives further experienced how immaterial issues like for example customer values became discussable through the physical representation of themes. Earlier it had been difficult for them to articulate and discuss such matters, but by applying the Video Card Game inspired activity it proved easier. An experience that tallies with the student' learning about preferring material representation of immaterial issues.
In general the company representatives experienced that they have been introduced to a set of new and useful methods, which have opened their eyes to new ways of thinking and doing in an innovation process. However they emphasized that the role of an external part in the use of the methods would be essential to their future application of them. Through the project process they experienced how the student' role as facilitator and of breaking down well known mental boxes of strategic categorizations were essential to the successful use of the methods. Without this external part to challenge their mind-sets they expected the outputs of the methods to be less surprising and giving.
In addition to the gained methodological experiences the company representatives also learned an important lesson about the company' culture, forces and limitations. Their effort to communicate and clarify their product range with their strengths and differences are not sufficient as they through the Video Portraits saw several customers choosing a wrong ladder causing considerable disadvantages for their conditions.

6 CONCLUSION

The problem of bridging Top-down with Bottom-up was an attentive problem for both the student and the company. The student was curious of understanding how knowledge of user behavior could have strategic impact on a company, and the company had observed an urgent need for understanding their end-users needs and requirements. This was the initiating motivation for the collaboration.
As the collaboration was established the students PBL approach provided a situated and inclusive collaboration that obtained a relevant and interesting progression for the involved parties. With the PBL approach the student's focus was not solely dedicated to solving the problem of bridging Top-down with Bottom-up, but also the facilitation of the collaboration with the company proved to be significant for a fruitful outcome. The collaboration offered the student valuable insight into the ways of working in a medium-sized company and an understanding of the challenges that these companies are confronted with in the current marked. For the student the project also resulted in valuable domain specific knowledge and it offered an interesting opportunity to understand own competences and perspectives of future work life.
The iterative and continuous collaboration enabled the company to understand not only the results, which they also partly developed, but they were given insight into the way of working when applying a Bottom-up approach. This means that the company did not only achieve knowledge of their end-users and inspiration of how to bridge between the two approaches, but they did also attain knowledge of how they in the future could conduct Bottom-up activities.

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